Notebook, N-05-02-07

This notebook covers the period February-June 1905. Most of the book contains notes, primarily by Edison, regarding storage batteries. Among the entries are items pertaining to the preparation of nickel flake and to the loading of the flake in the tubes within each cell. These entries were witnessed by Frank L. Dyer. In the middle of the book are abstracts relative to the nickel preparation, which an unidentified experimenter copied from scientific journals. Near the end of the book are lists of cells to be used in endurance tests. The front cover is labeled "Tubes Record." The pages are unnumbered. Approximately 140 pages have been used.

Feby 7 1905

Mar 23/05

Try reversing old pocket 24 hours Weak Bromine water to eat any iron out - dont think Br will hurt plated Ni much if dropped right Time,

Get drawings of Mixer made for mixing Arc light Carbons made for Cleveland plan

Make some Nickel flake coated Silver both sides -

Make some Copper flake coated Nickel both sides -

Make some Nickel flake Coated Copper both sides

Make some Nickel flake coated Bismuth both sides

Feby 7 1905

Make some Nickel flake coated Cobalt Bath sides,

Abroqiot make some more 6 8 10 12 o/o Hg –

Reverse an iron (+) anode & Eat out all Cu by Bromine see if it runs –

See if can stick Ni flake on thro 20 mesh NiOH by using mushy nickel hydroxy pretty thick –

Chloride Fe pass H over valuable & HCl absorb in H_2O –

Oxychloride Nickel – think NiCl dissolve bit of NiOH this would often dry powder in absolut cond reject amount of powder to get proper porosity

Feby 7 1905

Received 2/9/05
G. D.

Chloride Nickel Volatilizes in Spangles like Mosaic gold can't be reduced by H to get flake Nickel

Precip NiOH leave Na_2SO_4 with excess NaOH Boil then semi dry but still paste plastic then paste in Cups + dry then press + Corrugate then wash hot water till SO_4 free Then Cake no graphite. also powder Coat graphite + use repeat – also with flake Nickel Molasses – 1½ gram –

Antimonide Nickel Thin plates, by fusing 2 atoms Nickel with 1 atom Antimony, Watts Vol 1 316 –

6% Bismuth with NiOH, New process 8 & 2 flake Nickel finger mf smelled amount explosion possible 2 Cups m 1 gr. D 0003 flake Ni also group flake Ni thro 100 mesh

Memo 2105
9 4 P

7 Feby 7 1905

Missabe ore treated to free of gangue by fusing KOH, also acids or also Hydrofluoric.

See J Gubkin Annales phys + Chemie [2] 32 p 114 - method making films - Edward Chem S Jnl 1888 p 101 says cannot passing from surface of a liquid its and or a vapor - Vac - or gas about it gives films which float on water (Gubkin) Cohen tr is a plating Sol.

Basic Meconic Salicylate dol in KOH. without change its pp by CO_2 + acids. Lajoux J Pharm Chem 1903 | VII 17 412 418

Cup filled Ni Red by H then act on with Current in Hypo in weak KOH - Hypo see of H goes to NO_2 -

Make Ni film 0003 0004 0005 0006 - + half mesh + coat Ni

Feby 7 1905

Carb Ni pressed in Cup & whole reduced by H. then hydroxide Ni got in by soaking & pp Salts,

Groups grew in KOH each group finger Coat with flake Ni with less & less Molasses — 8 & 2 — 1½ 1¼ 1 3/4 grain —

Cup in grid with powdered KOH, then dip in Ni_2SO_4 until whole pp —

Cup with powdered dehydrated Ni Sulfate Corrugated then suspend in Nitry Gas dito another in KOH, also Alcohol + KOH, if well too much add to KOH powder K_2SO_4 powder

New idea — Parchment cup electrode in Carbon, KOH, + Ferricy K 72 Conc Ferricy in pchment dots as depolyr — possibly Saturated Ferricy in KOH, + Ni dust powder Ferricy K in parchment Cup

Feby 7 1905

Molasses flake Ni-green- make ten dips in Nimine after final Corrugtn.

Plain green thro 150 mesh 3 grms after Corrugtg. 10 dips in Nimine
ditto thro 200 mesh

~~[illegible]~~ Make stuffed NiOH paste pasteable, paste in Cups + Corrugate let it squirt out what will, clean that off —

Precip Ni Sulfate by excess KOH, boil — dry — powder thro 20 mesh + make a group no graf — also graf also Ni flake if graf works

Work 2 hrs
J.D.

Feby 7 1905

Group M Reduced by H,
3 grms KCy in KOH, see of
action KCy will make it
active,

Nickel amalgam squeeze out Hg by
bag & hydraulic, see if gets active,
in KOH, alone or with KCy 3 grms

Group grids saturated with strong
KBr & then mummy put in 21%
& chgd from Hg

Charge this group in 33% till
shows good big Capacity,
then when chgd dry & take out
mix powder warm gently &
put in new Cups
drills, after discharge in 33%
Run in 21% notice swell
drills both after chg & discharge
in 33% Soak out in water all
KOH & dessame Mummy

Jones Ni
F.D.

Feby 7 1905

Will Carb Ni dry be reduced
by hot NH4 to form Valuable
Carbonate, If so it would leave
the Ni anhydrous, would it
be active, How about Ly and
Ammonia - would result
be active, or attacked by Hydro
Would Oxalate be decomp dry
Dry ammonia —
Is Carb Nickel decomp by
Absolute Ammoniated Alcohol

Set up in pressure room
Call with attendant Current
to make Nickel hydrox according
to Nef Mans patent —
also get Gatelle he gave me
dry + test it —
get Hns patent —

Feby 10 1905

Will Carb Ni go mushy if acted on by BaOH when BaOH very dilute —

Work up method forming Ni_2O_3 by Electric method. The K salt that will not settle + will scarcely any alkali —

See if possible make flake Ni sulfide by acting on Ni flake by H_2S hot — its possible there is too great a drop of EMF Get a good Carb + Ni_2O_3 + there may be a decomp action which would take place if flake was poor Carb like graphite — The Sulfide would Go Even poorer than graphite —

See if Nickel film carb Go Changes to a Nitride by heating in Ammonia or other

Feby 10 1905

Examine the remaining two cups
Each group in not ~~on~~ Endura
with cups plated Cu Ag Cd Zn

Write Jim White see get 004 or
005 strip Magnesium Rod width
+ price

Is there any Ferro of a metal
not decomp by KOH if so
Cared use it as depolarizer

Put highly polished Nickel
strip in KOH, 100 cc Containing
5 grams Aluminum see result of
Current, dittto 3 grms KI
try weak + strong Currents,

Do Vanadium Rolls Iron pickups No flake
Cracklec blushed by Va oxide which is
a Conductor, both oxides (lower) are
Conductors

June 2 1925
9:20

Try polished Ni strip + deposition in Vanadium Solutions –

Cross scratch 100 mesh the Nickel plate for forming flake Ni as of Cake Gr Crumpled,

Increase high Crop 33% discharg Ni by reducing at Cathode half + soaking out KOH, + powdering again to further reduce – see if lumps are still there, also try without reducing + while charged use 5% KOH to pass it so as not decompose

A Group charged 21 dis 33%

Another charge + discharg twice in 21 discharg once in 33%

Group with MOH from Group of Manganese – with + without graphite potassium permanganate and aluminate

Jan 22 1945
J.E.D.

Chg dis then chg — 21% a group
then dry with KOH in then powder
warm put in new Cups —

ditto get all KOH out

ditto leave KOH in but do it
in discharge state,

ditto Wash in alcohol

ditto chg + Discharge in 33%
wash out with alcohol
put in new Cups

ditto chg dis + chg 33%
wash out alcohol —

All the above to have
3 or four runs so as to get
right capacity before
they used

Remarks No.
8/20

Chg & dis after 4 runs — 21%
wash all KOH out by alcohol
+ 12 run without pulling in new
Cups —

ditto charged

ditto 33% chg'd

ditto 33% dis chg'd

ditto 6% Bismuth in KOH,
after several runs 21% dis
+ wash alcohol & put in new
Cups

ditto chg'd —

Boil in KOH 5% — old No 26
Cups some hours, see if get
redness out

also soak alcohol warm to
get KOH out, remove carefully
weigh — throw powder &
put in new cups

Lunch 1:00
9:20

Dave old #26 cups + put req
mix in see if OK —

Chg in 21% group — wait 24
hours drschg. Wash chg right
away let it ~~sit~~ and chg 24
hours + drschg — then to allow
KOH soak in —

Run a Curve on Wadsleu
battery Holland Lot,

Make one with 6 grams
Reg mix to get liquid
Electrolyte —
~~ota~~ Spoldeep Cups —

Jan 20-Feb 3 '20

Make Extra deep Cups + use
fingers molasses Dissolve at amount
Molasses + 6 gram Cake

Grump Mi flake 1½ molasses
Congeals + then soak out,

Group 2 cups to a gal qwz
to warm to clg + also 33 1/3
for cold heals

Acetate Mi dissolved in Glacial
acid, then Chlorine to peroxide
also, KOH anhydrous to
neutralize Glacial + form
acetate K - dissolve out
see nature of MnO4,

Anhyd MnChloride in Glacial
acetic, Chloroform,

Mad. 1908
8.20

See Holland about
Endurance of chg. really
get proper chg + dis

Strength Ni Saponified
by Hypo

Some green NiOH. by pp Sulfate
so there is always 3/3 Ni Sol.
of free KOH. Sulphate put in
40% slowly + when it gets
to 33% add more KOH, see
if nature of NiOH changes
& try group with + without
flake graf best proportion

Heat 2.05
8.20

3 grms Green chgd 15 hours
only take 200 Mach out
& reching do this 3 times
then make a fuce dueling

Flake Ni plated both sides
Copper

ditto Silver

ditto Bismuth

ditto Thorina

Flake Thorina

Flake Copper plated both
side Ni

Flake Copper plated both
sides Ni then Bi

June 2/26
9:20

Probably a Crude Thorina solution
get by using Wenozite fusing
with Acid KS_2O_7 or K_2CO_3 +
then Sulphate the whole and
thorina plate out –

Ralph dont fail make Enough
Colbalt Oxal red by H. for
4 groups with + without Hg
to be used as now + also w
Ni – with + without grafite

Just the thing – Cups heavy
flashed Cobalt + welded
get drop Emf – also Cups
flashed Ni then Cobalt
+ welded –

If possible make a group
with perforated sheets Magnesium
way + lay on Each side of
Cups along Reg mix + also
plain grid

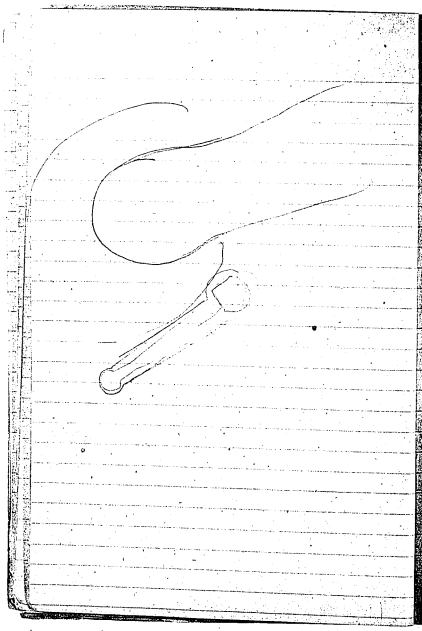
June 1, 1905
3.20

The very Cold and Hot KOH get when expanding with Na Citrate in KOH, dried + tried.

See if Can plate out anything from Ni dissolved in KOH with Citrate also Tartrate, possibly powder ok —

The greater the Nickel surface outside a Cup the less will be the internal gassing with a given chg — Same with urea — try to cell with 2 72 1 Ni but outside Ni surfaces 10 times the Cup surface + run chg Curves —

Benzol + Rosin to attach flake Ni on green



Dec 23 '45
9/2/8

Alcohol + shellac filtered

Beyol & Coal tar pitch filtered

Gutta & Beyol filtered

Ralph reduce low temp.
Some Ni salt by H. that is bulky + will hold shapes
Can put down kinds in a little metallic cup with several compartments,

Try 7+3 flake Ni rolled
Neutralize with KOH,

Fungermix Ni flake minus
Molodan, flake through 50 mesh, ditto 80 mesh
ditto 120 mesh

Jan 25 1905

7/D

It is probable that Carbonate Ni acted on by Hypo the OH taking place of CO_2 will still preserve pieces as they hold Co_2 Ch + give a porous NiOH possibly Oxalate + other organic Ox. Ni which can be Oxidized by even Geller should not of think by any free alkali — Hypo

Carb Ni in grid & then treat Hypo — plain or with grid + Ni flake

8 + 2 — flake Ni 1 of the Ni flake through 120 mesh & put on 1st the other 1 thru 40 mesh & put on last

Minimum Sugar less than 2 -

Dinan-assay Corr-of Drill hole
Shewinsville

Set up two rolled out Magnesium tape, free oxide rolled .002 thick assay Continued in 21% KOH see of stable —

See how thin Can roll Magnesium tape smoothed to free oxide-several pieces together,

Burnish Metal reduced by Hydrogen to flake it also by rolls moving reg a one roll faster than the other. Try fused Ni salt which when reduc by H, Each particle same size so flake Even

Plate Copper .0003 + on Each side .00005 Nickel —

Buy Magnesium powder + burnish to flake of different rolls

Lunch 2/20/
RKD

Reg Cupes 1st part — 1/3 Cuek.
of 3 ground green — Then Magnesia Oxide
1/3. Then green Ni OH.

NiOH
magnesia OX
NiOH

MAR 20 1955 RKD

The MgO affording a drainage of KOH.

See Dyer filepitted flake Ni & process —

also plating sphet graphite Ni rotating bbl —

Have Cooky draw Curve of loss of Capacity by Cell Endurance for each of the runs, to Compare with little Cells —

MARK L. DYER
MAR 29 '35

Make group tough Ni — 820
256. $NiOH_2$ 1.86 Ni flake - 6g
sure tough - [illegible] - Molasses
Thus is 58% $NiOH_2$ —

Look at Talc under Minerals (10)
French chalk see if [illegible]
flaky - possibly [illegible] in
Ni salt. Nimme for molasses
[illegible] H_2.

Try dif plating solution for
Ni film - possibly some local
plate then all right - Cyanide,
Double oxalate, Chloride
Acetate etc

Try non as eating base
material Zinc or highly
polished Nickel possibly
give more coherent film
also try plating Zinc yet
better surface

Feby 23 1905

920

Try find something to do away with use of Beeswax to get film tough

Try amalgamated Electrodes

Dinan assay Cores of drill holes Steamboat Hill

Set up 2 thin sheets Magnesium in 21% & charge continuously — no-

Photo Cu very thin & tough with Ni on each side .00005 Cu & the same both sides thus give tough flakes —

Reg Cups — Green MnO2, Layer green 1/3 layer MnO 1/3 & green 1/3rd to make internal Reservoir for KOH & give elasticity —

L. DYER
11 MAR 1935
SEN

See Dyer about patent flake Ni
Co etc

Write Bergman drawn conc re
objection of plated & welded etc
keep shape, not objection tbls

See if Cuprous & ic scales Conduct
Current at all —
Also Sulphides Ni — also Norway Hematite
Vanadate Fe —

Try flakes Sulphide Ni —

Try cups Ni sulphide) slightly
not by HS — Also Nitride purified
not by NH3 —

Fe unequeen pressed impress &
distilled in H or Vac till
no pyro — test.

Try $Ni(OH)_2$ in Hydrogen between 190 or 215° deg to dehydrate & test in cell for a well of capacity

To make Hydrate safely from Na – passed decarbonized dry air over it till all Na_2O –

Try deposit or rather sulphurise electrically in KS to form conducting sulphide for a surface coarse thus to deposit Ni & see if it will self peel off –

Reverse a RCy (alring) & Highly graph so as to plate Ni on graphite, then soak out RCy & put in new Fe –

F40

LUKER
ORANGE, N.J.

find some Ni crystals that are uniform in size say through 50 to 100 — reduced by H & roll out to flake by using oil stained 6 oz 0.04 cubes

Try NH_4 to bring old No 26 Cell back —

Group in which seeg mix is poured in cups — | ditto green
ditto poured — water —

Ni flake deposited from Ni Carbonyl

Ni_2O_3 dis in NH_4 Evap on cylinder to film & scraped off in 60% Red by H.

Powdered Specgl Persian powdered 200 mesh use H_2O & dec of an oxidation Mn ores in solution & makes it gordon —

Magnetite powdered & dropped

GED

Varnish of Ni acetate in thin layer decompose by heat & reduce film by H_2

Squirt Resinate or Schmidt Nickel into water & Oxidize Organic out – squirt & in film shape by dia.

Squirt $Ni(OH)_2$ paste by $CH_2 = Hg$ –

Squirt CaOH into sulphite Ni

Possibly phono cylinder from an amalgam Ni ground before polishing to hard –

Make 66 to 67 33% Cu amalgam distill of Hg rub on cell & possibly R in H_2 or double under only –

MAR 1 1933 GES

Possibly by using Sn. Pb Zn Cd
Cu Ag Al Mg gum all together
they will not crystalize & make
a good record Cylinder
for phono when pressed —

Cobaltocyanide of Ni soluble
— NH_4 when slowly evaporated
leaves crystalline scales —

Ammonio Ferrous Orthophosphate
in pure Ammonia. when boiled
with KOH. decomposed leaving
Ferroso-ferric oxide preserving
shape of crystals —

Ferric Ethylphosphate
draw yellow films

Nickel Diethylphosphate
Crystalizes in groups of lamellae

242

220

Bromide Ni anhy scales
Iod. do do " "
Red Iodide —

Potassium Barium Nickel Nitrite
Microscopic tablets.

Sulphocyanide Ni crystals powder

Ammonio Sulphite Ni Cryst pp

Amylsulphuric Ni & ammonia

Ammonio Lipo-sulphite Cryst powder

Ammonio Dithionate Ni tablets powder

Metabisulphate Ni Tablets

Adipic Acid Ni Scales

Bismuth Chloride Solution
Bi Ammonio Chloride 25 to 30
grms per litre Cold —
Sko Classons Electro anyl —

✓ 820

to make Mn peroxide. Electrolytically use alkaline solution MnH
Cream Sartan - does MnO2 not stay
Little Jade Wood
Wernicke Zeitschr f Chem (2) VII 85
Pog Anal CXII 109

Lelande use cylinder method
plates submit junction Bergman
Paint. Plate No 6 Ellis 1 plate
Precipitation.

Recipe for Flake Mn in old packets
sweet chocolate in plating of
10 liters or gr full acid

Ferric iron Oxalate gives Ferrous
ox at 45°C in 6 hours. Metal
in 12 hours —
at 35°C Magnetic iron in 1 hour
Ferrous ox 10 hours metal 36 h
Thus for Ralph it get non pyro
iron fine —

Perhaps deposited Mn_2O_3 also deposited well scale easy especially on grinding then red by H —

Try put MCP only in Conc $Na_2S_2O_3$ solution get MS scales

MnO_2 fuse in K Metavanadate (fused) in presence MCP Crystl in Micaceous Lamina

Na Metavanadate gives deep coloured Lamina — $2MnO.K_2O.V_2O_5$ —

LEFEVRE Compt R 110 405 408.

Supposing alternate K + M MCP & blow lamp bubbles make film, oxidys + red by H.

Collect all the acids in Lab + make M Salts see if get scales — OK - now get

EJD

E.H.J.

To obtain Ni salts by genuine
use NaCl + the alkaline salt
of the acid with excess chloride
Ni —

Salts which act as buffers
or by themselves when heated
to make genuine NiO — Lime —
acetate — formate — quinine — citrate
Sulph — Mono chloracetate salts.
Dulfothiosamin large reserve
Cont prefs but salts
Chlorochromic fair dod melt
f chlatic permanency

Steel Inchel connection
Deliver film — also f film
surface by plating Zebron
to make dirp chalid + cl
shelled Hydrogen

Inchel Rare metal film
film —

LIBRARY

LLD

Get pulverized mono-plate a
fusion of V.a 1110 Cr Ur WO3,
also Long Ni plate with same
metals base of Carbonyl or
if they are oxidized in 33% long
distably

Group flake Ni 743 flakes
Ni vacuum H, Metal mono —
2 cuk out big jar —

Group Gas a fusion process
Ni flake 743, Metamorphosed Sorted
big jar — also Rolled KOH
moist rag cell way
also 743 Treated Ni fulmby
rolling — out Metamorphosed or
Rolling —

Put clamps on 2nd Ni flake
cell & made tracer of upper
Capacity

Warren under Micro particles
Ingy on plated Ni silver, Copper
& the metals graphite, etc

8.12 of iron oxide 2 to 200 mesh
quantity with much Ni - dry &
crush Sieve thro 20 mesh 3.12
Cake to see if produces fibrous mass
has anything to do with it - 3.
grain also 8.12 magnesia -

Group III of Cake from Nitride has
fumes of Cake - also sulfide
has fumes of flake -

Make 2 tri oxide keeping detls
Mixture with mixture of Carbon
Coated with N_2O_3 analysis from
ignition of Nitrate in - also
heat loss keep -

Warren test of N_2O_3
analysis combustion in
KOH. possibly best way
test for to Cake MgO
Soaked strong $MnNO_3$
brot up to peroxide -

E.T.D.

Qwa make Multiple Hq
Acc of Cy rd -

Get several baskets & cover
foil & make group
743

Cut group made Cups with
gratte, make wing, Rq mp so ak
make mistake

MqO. Cake, then so ak in water
fr warning MqO. to inform
the Opp the mp to send bottles
detail strength of before opening

40 inch green Red with by
five flat mp Cups
to supply by Curtis

ZED
CENSOR

Cakes for persons Ni. cake by soaking in R Cytt,

Phosphate Cd, Sr, Zn Ba, Mg Cd, Cu Sb, These metals in cakes with a binder possibly phosphoric acid to make a glass phos. pressed + baked then soaked once or twice with or without salt formate, acetate Ca, Sr or nitrate, to convert some of unworking + reduced cytt, or second second time, baking after each with R. L. Ni then Zatum cut Phosphate by H_2SO_4 or HCl. then parts. Cakes in grid by nickel salt or impregnate in solution with Ce cytt to crack plates to grid — + then filling parts by successive dipping + charging for Cond. Nickel salt, or Nickel Nitr — 220

(Cake Mg - soaked some water or
ROH & heated)

Cake Ni R 6yH, then soaked
in Ni salt ~~soln~~ & reduced by
H. then leached & stripped
by R 6yH after leached Salt
& making the process Ni active
by acting on it by KOH with
HCl or Hypo & charcoal with
some KOH. Also Ni OH reduced
H where in powder & Cake pumped
(which will be more porous
than Ni by H from Cake)

also Cake 50% Fe_2O_3 50%
NiO — mixed with KOH as binder
& pressed in Cake & Reduced
by H. The iron Zalen
out / by Acid Can vary
the proportion

also Fe_2O_3 Cake soaked
Ni Salt Reduced by H then
iron Zalen out —
Ni OH2 got by soaking
process) —

2x2

MP of fluorides: CaF_2 520
ZnF_2 734
SbF_3 292

Chlorides: $CaCl_2$ BP 185
$CaCl_2$ anhy 723
$CaCl_2 \cdot 6H_2O$ 28
KCl 730
$MgCl_2$ 708
$MnCl_2 \cdot 4H_2O$ 87
PbCl 500
$ZnCl_2$ anhy 262

Oxides: Boron trioxide 577
Chromic " 200
CuO – Red heat
K_2O " "
MoO_3 759
PbO – Red heat
Sulphur – 200
Arsenic trioxide "

Ba Chloride 400
K " 334
Hg " 40
Na " 302

220

K Bromophate 210

Borate
CaB6 010 450
NaBorate anhy 561

Malleable Nickel from Journal Chem Society of London - 1880 pg. 930

By J. Garnier (Compt. rend 90, 331-333)

By adding to pure nickel, which after fusion is brittle, some substances which will readily combine with the oxygen absorbed by the molten metal whilst cooling, and which will diffuse through the whole mass, it may be made perfectly malleable. Phosphorus is not adopted for this purpose, 0.3 percent being sufficient to render the nickel soft but malleable. A greater quantity of phosphorus makes the metal hardder & less malleable. The phosphorus is added in the form of phosphide of nickel, containing about 1.6 per cent of phosphorus. It is prepared by fusing a mixture of calcium phosphate, silica, charcoal and nickel. Nickel containing 0.25 percent of phosphorus may easily be rolled into leaves 0.5 mm. thick.

L. T. O'S.

F.K.D.

Winkler on nickel - Journ. Chemical Soc. of London
1880 pg. 771.

Winkler describes the preparation of large castings of nickel and cobalt and of ductile nickel. He succeeded in obtaining the latter by removing carbon & silicon from nickel by means of fusion with oxide of nickel. The metal shows a tendency to become crystalline.

Preparation of malleable nickel and cobalt, and the application of these metals in the pure state - Journ. of Chemical Soc. of London -
1879 - pg. 563.

By - T. Fleitman (Deut. chem. Ges. Ber. 12, 454-455)

If magnesium in the proportion of one-eight per cent is added to nickel & cobalt, it becomes malleable and ductile and susceptible of a high polish. The alloys do not alter in the air and are well fitted for making hammers &c. They can also be welded to iron and steel at a white heat, & rolled into thin plates without separating from these metals. The same results could not be obtained with manganese, aluminium, calcium

&c. The addition of a minute quantity of magnesium to some other metals e.g. steel, causes a great alteration in structure. Whether the magnesium acts by destroying carbonic oxide, or from its great affinity for nitrogen by breaking up some compounds, such as cyanogen, the author leaves undetermined. The modus operandi is to drop the magnesium through a hole in the cover of the crucible, having previously introduced a few pieces of charcoal to remove oxygen - E.T.a.

Silicon - Journ. Chem. Society of London - 1888 - April 15

By - H. N. Warren - (Chem. News 57, 54)

The following is a new method of preparing silicon. Small bars of "silicon-iron" are suspended in dilute sulphuric acid from the positive pole of a battery of two Grove chloride cells and are in contact with a platinum plate forming the negative pole. The iron dissolves and leaves a residue of graphite, silica, and amorphous silicon, which is treated

to redness in a stream of carbonic anhydride, and then to a full red heat in a closed iron tube with some zinc; the zinc button obtained in this manner is dissolved in hydrochloric acid, when crystalline silicon remains undissolved; by heating the amorphous silicon at a full white heat with aluminium instead of zinc, graphitoidal silicon is obtained. When an alloy of aluminium and silicon is heated to low incipient white heat with potassium silicofluoride small quantities of silicon are produced in the form of a bright reddish brown powder.

Passivity of Iron & nickel — J. of Chem. Soc. of London 1888 - pg. 788

By E. Saint-Edme (Compt. rend. 106, 1079-1080)

Commercial shot nickel is passive in ordinary nitric acid whereas iron is only passive in fuming acid, but iron in contact with nickel becomes passive in the ordinary acid. Iron becomes passive gradually but nickel is passive immediately. If iron & nickel are intro-

duced into the acid together the iron likewise becomes passive instantly. Electrolytic nickel from an ammoniacal solution of the chloride or sulphate is passive immediately. Iron is only passive when agotised and loses its passivity if heated in hydrogen. Passive nickel when heated to a bright redness in a current of pure hydrogen yields a small quantity of ammonia and acquires a silvery lustre but remains passive, and hence it would seem that the nickel retains some of the nitrogen very tenaciously. C.H.B.

Nickel ammonium Oxalate - J. of Chem. Soc. London 1888 - pp. 788

By K. Kraut (Annalen, 245, 239, 240)

Nickel oxalate dissolves in ammonia and the solution deposits green microscopic crystals of the composition $2NH_3, NiC_2O_4 + 5H_2O$. The compound effloresces on exposure to the air and loses three mols. of H_2O.

Passivity of Cobalt - J. of Chem. Soc. London. 1889 p. 1114.

By E. Saint-Edme (Compt. rend. 109, 304-305)

Pure cobalt is instantly attacked by concentrated nitric acid and if the metal is withdrawn, exposed to the air and again immersed the action is as vigorous as before. Contact with steel or nickel does not, as in the case of iron, arrest the action of the acids. Cobalt is however not attacked by dilute nitric acid in the cold.

Electrolytic cobalt, unlike electrolytic iron or nickel, does not contain nitrogen and yields no ammonia when heated in pure hydrogen. After being heated in pure nitrogen for a long time at a bright red heat cobalt is somewhat less rapidly attacked by nitric acid a fact which points to the possible existence of passive nitride of cobalt similar to the passive nitrides of nickel & iron. The passivity of the three metals follows the order of their affinities for nitrogen which is, nickel, iron, cobalt. C.H.B.

J. Chem. Soc. London.
1877 - pg 82 -

I am indebted to Dr. Russell for the nickel and cobalt used in these experiments. They were portions of the purer metals prepared for his research on the atomic weights of these elements (this journal XVI 5'; XVII, 294) the nickel was in the form of hard, dull grey cubic lumps. On analysing the gaseous mixture evolved on dissolving it in nitric acid, it was found to contain hydrogen, of which 1.47 cc. was obtained in Expt. I, and 2.28 cc. in Expt. III, or 6.25 cc. and 6.17 cc. respectively from 100 grams of nickel. As in the course of this investigation the production of hydrogen has never been observed on dissolving metals in 1:2 acid, or indeed in nitric acid of any strength, and as moreover no hydrogen was obtained on dissolving fused commercial nickel (Expt. III), there can be no doubt that the hydrogen had been occluded by the metal during its preparation from the oxide by

reduction in hydrogen. This fact that occluded hydrogen is without action on nitric acid is, however, of very considerable interest, as it may be possible by the action of nitric acid to ascertain whether, as has been suggested, a portion of the hydrogen occluded by palladium is combined with the metal. I also propose to apply the method to the study of the gases in meteorites, and it may here be remarked that this discovery of the power of nickel to occlude a very considerable volume of hydrogen explains the occurrence of such large amounts of this gas in meteorites which previously on account of the slight power of occluding hydrogen which iron alone appeared to possess, was somewhat difficult of explanation.

No hydrogen was obtained from the cobalt, although it had also been prepared from the oxide by reduction in hydrogen. But the piece dissolved was the only one

in the bottle from which it was taken presenting a metallic appearance. The remainder of the specimen had assumed a brown friable condition, having evidently undergone oxidation. I am inclined to believe from this that the cobalt had originally been charged with hydrogen, with the expectation of the piece used by us, which was extremely dense and compact. The spontaneous oxidation of metals prepared by reduction in hydrogen is in fact very probably always due to the presence of occluded hydrogen —

H. E. A.

J. Chem. Soc. of London
1890 II pg. 563

Nickel oxide dissolved in potassium metarsenate to the extent of 8 percent yields the compound $12\,NiO, 3K_2O, 5As_2O_5$ in prisms, which are probably rhombic. With a higher proportion of nickel, the product $2\,NiO, K_2O, As_2O_5$ is obtained at the same time; and in presence of potassium chloride it is the only product; it crystallizes in large, pale yellow, micaceous lamellae which deposit light feebly. Sodium metarsenate yields green, transparent, monoclinic prisms of the pyro-arsenate, $4\,NiO, 2\,Na_2O, 3\,As_2O_5$. In presence of sodium chloride, the compound $12\,NiO, Na_2O, As_2O_5$ is also obtained; the latter is the sole product when sodium pyro-arsenate or ortho-arsenate is used; it crystallizes in green lamellae; dried, formsh exagonal prism.

Cobalt oxide in small quantity in potassium metarsenate is converted

into rolls mamillary crystals of the compound $2\,CoO,\ As_2O_5$, which act on polarized light. With more cobalt oxide, the product $2\,CoO,\ K_2O,\ As_2O_5$ is obtained in slightly opaque, blue prisms with longitudinal extinction. This compound is the sole product in presence of potassium chloride. Sodium metarsenate yields the compound $4\,CoO,\ 2\,Na_2O,\ 3\,As_2O_5$ in rolls, strongly moiré lamellae, isomorphous with the corresponding compound of nickel. In presence of sodium chloride the compound $CoO,\ 2\,Na_2O,\ As_2O_5$ is also formed, and is the only product when sodium ortho arsenate or pyro-arsenate is used; it forms blue, transparent crystals, isomorphous with those of the corresponding manganese and cadmium compounds.

Cobaltous Sebate — Journ. Chem. Soc.
$\{Co.C_{10}H_{16}O_4\}$ — 2nd Series Vol. XIII pg. 309.

Cobaltous Sebate was formed by dissolving freshly precipitated cobaltous hydrate in aqueous sebacic acid with the aid of heat; evaporating the solution to dryness; and after digestion with boiling alcohol, drying at 100°. When thus prepared, it is obtained in rich purple-blue thin scales, anhydrous, and sparingly soluble in cold, somewhat more freely in hot water, and forming a rose red solution. By cautious evaporation it may be obtained in thin red scales, containing water of crystallization, but always mixed with a small quantity of the blue scales. Solutions of cobalt salts are not precipitated either by sebacic acid or by soluble sebates.

220

FRANK LOVER

March 10 1905 –

By precipitating Ni + Co together in various proportions with NaOH, boiling + washing we get a mixed hydroxide of the 2 metals. These are dried and powdered + pressed into a cake with NiH. Then the cake is reduced by hydrogen + then above a welding heat almost to melting point. Then rolled out + made into flake – also the powder can be dried + reduced as powder in Quartz. Then separated by magnet + reduced with fuel to flake – the addition of the Co to the Ni makes the flake give good contact. This is an alloy + yet is not an alloy it is a

FRANK LOYER
MAR 1906

Mch 10 1905

Very peculiar metal ~~[illegible]~~
Each particle of Co + Ni
are separate physically + not
molecularly as of the
compound ~~[illegible]~~ and molecule
Hence either metal can
act alone as a metal
as Co is oxided in + goes
to a peroxide in KOH Co
current + Ni does not.
The Ni serves as a frame
to prevent the Co from
disintegrating ~~[illegible]~~
preserving Conductivity
of Contact in the battery
between the ~~[illegible]~~ Co
the green hydroxide of
Ni

This idea ~~[redacted]~~ from
applying dies for
another purpose

970
BANK LOVER
MAR 1 1905

Mch. 10 1905

Mixed oxides or hydroxides of Iron & Nickel 40 Ni 60 Fe are reduced by H from above welding heat. Then the Cake or powder is used in the battery the non being electrolytically leaving the Ni to act as a frame work preventing disintegration — also serving as a Catalyst. possibly a little Cobalt should be added to insure Ni making Catalyst thus the Mercury will not be essential —

Again with Ni + Iron in form of a Cake, 50 Ni 50 Fe the Iron can be plated out electrolytically or by acids leaving the Cake of Ni intact + porous thus. the Ni spongy plate

March 10 1905

is acted on by NaCl a free NaOH by Current & N_2O_3 hydroxx formed within the spray. ~~[illegible]~~ If the M & F's way method the mercury could not be eaten out without decomposition.

The whole compound is novel a metal within a metal. There are probably many things this doubled developed principle could be applied to besides battery purposes.

EED

FRANK L. OVER
MAR 13 1905
ORANGE N.J.

March 10 1905

A good way of forming

Pos plates of Ni_2O_3 H_2O or NiO_2 H_2O is to charge in 33% KOH charge — remove from KOH + dry with KOH & then Recharge at a higher pressure — 1st Cor 75 ampere finally at 200 ampere — The full react is pockets which never swell so much + do not thereafter swell to same extent as original

For making very thin flake — plate sheets of iron with $Ni + Co$ in right proportion by regulated amperes in Epel anodes of CuO_2 metals — then weld in Hydrogen — then cut in squares 1/8 a roll in oil — after

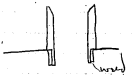
Mch 10 1905

Est non cut by wedge or
Current thus leaves the
film very thin + double
covering power

Mch 16 1905

FLD

FRANK L. DYER
MAR 16 1905
ORANGE, N.J.



John Ott makes model filler
quart top cell also Edgelock
Cups to Electric weld nickel
solder

See about Cobalt plated
Cups - Q

See Webber about brass
posts, drop forged Ele
Warren make 60 Co 40 nickel
40 Nickel by using
Ni plated + Co plated
Shells 20/1000 thick

Mch 16 1905

GRO

Na fluoride MP 908 C
Sulphate K 861
" Na 865
Carb K 834
" Na 818

Ni 1200 to 1400 C
powdered from scale Ilmo 30 on 60
mixed with Ni Co 60/40 flake
healed yellow white ~~[illegible]~~
& non Eaten out —

Phos Lime get some Apatite
powder 30 on 60 Cover with
flake Co/Ni press 150 almos
Corr then soak out malon
Re Cor 200 Run to wed by
heat — H dissolves out
lime with dilute HCl.
also fuse pp phos lime —
Tri Ca phos

See Louis about prepared
Cell cup —

FRANK L. DYER
MAR 23 1905
PATENT OFFICE

March 16 1905

MgO moist with Carb K water press + dry screen 30 on 60 coat with Co/Ni flake with Mol Nitrate) dro out Mol + K_2CO_3 + H_2O with, dro out MgO by [illegible] Sulphuric

LD

See if Carb Mag Magnesite Contracts on heating to white if Carb act!

Ralph make Iron by H, then pass N in Hyd to see if N absorbed Rdg Lope + Ital,

Speak Jwa about danger NH_3 falling in row from by H, use buffer

Trimagnesic phosphate Ortho or neutral salts is only [illegible] after equation needed

Obl acids Ev mag Cu dolid heat, better than phos Ca very high MP Tinsley pp 7, 10, 11. P + $MgSO_4$

March 16 1905

Phosphorus Metal melts higher than red - easily volatilized

Trisodic orthophosphate does not melt at strong red heat.

Put 1 gram .0001 flake Co/Ni in Cupel smooth press 25 atmos cold H.
also 1 gram with .0003 —

Wet MgO with Boracic acid

ignite while hot MgNO3 MgSO4 Mg Acetate,

Ignite to give Crystalline flake Ni flake hydroxide will coat with NiCo flake —

Try BaOH in Sol NiSO4 to get out SO4 + 1% H2O2 dipping sol

Mch 16 1905

get these amine ligands + test dealoxing power for $Ni(OH)_2$ + only Triaxyethylenamine — dealoxes +

Try also $Ni(OH)_2$ Hydrazine, also $Ni(OH)_3$ " " " NH4

Dry make the plating of graphite with Ni Co alloy instead Ni only

See Claims of Cook Check to Co alloy & Co alone

Mention Sublimed Chloride Scales tracked K+ Reduced by H also in Co + Double Chloride

DOVER
APR 1905
N.J.

#20

Mch 16 1905 –

Put in about 2 grams Cobalt flake (best) make 13 grds put in 21% with Rly chg density weigh accurately if put in long heat

Alloys with Ni flake –
Mn Pb Ag Mo Wo Cr Ur
Cu Sb Co Fe Bi –

Valability by sublimation
a mix of 60 Chl Co 40 Chl
Ni + see if in sublimation
the flakes are alloys

Making of Cake by rolling
Ahcaply to to ignite.
Nitrides of Co + Ni in
proportn to gives 60 Co
40 Ni Richness in 4
rall

LIBRARY

March 16 1905

FRANK L. DYER
MAR 20 1905
PATENT DEPARTMENT

Rec'd

Rec'd of Paracyanogen
Condensation of C_2

from oxalate of Uranium
UO_2 deposited as a
hydrated oxide —

Alloy Co also Ni with
Tellurium for flake
judging from reading T2 worked
I work with Ni

When get 60 Co 40 Ni flake
have groups run in 5 8
12 21 & 33% KOH & NaOH —
use Reg grain & macerate
Note Buzell —

Sponge cups dip in Conc
$MgCl_2$ dehydrate redip
till nearly full — then
soak in KOH & boil —

March 16 1907

Co Ur battery samples prevent deep impress of electrolytic action + but dark deposits from an Uranate -

Co + Sb in NaOH.

Co + Mg
Co + Cr
Co + Zr
Co + Te -

FRANK L. DYER
MAR 16 1907
ORANGE, N.J.

F.L.D.

I find that with 10 Ni + 10 Iron that in 21% it is not attacked perceptibly + even 15 Zr is Ni keeps bright - I am going to roll out some sheets + test as cups for bat with 5 Co. 5 Ni + 10 Iron. Think Contacts are OK + but Co will be too expensive. Cure small if Co used must plate + screed nickel

March 21 1905

grid like lead battery grid open both faces made of our grid stock 4 sides drawn — die — These apertures filled with flake or laid on flat porcelain slab with slab on top or ~~[illegible]~~ worked in the chargen pores after [illegible] filled by dipping process — next grid that may seem so far ok — don't come out

Allan

GLD

FRANK L. DYER
MAR 1905
ORANGE N.J.

Mch 21 1905

Fired 8975 today reduced in H. it swelled to 128 in center this makes it 119 but the welding is OK on dissolving the MgO in dilute H_2SO_4 shows fine cellular welded structure except where disrupted by swelling — Thes would answer but think later soda & higher heat in MgO better — We try tomorrow strongly ignited tricalcicphosphate it dissolved out white hard & after is very soft in dilute acids not attkg metal just — only from formation of phosphide

F. A. D.

FRANK L. DYER
MAR 16 1906
ORANGE N.J.

March 22 1905

We are making some cells today by opening one end of the cups inserting a blank that is larger than the cup & pressing or Crimping the cups in usual way then withdrawing blank leaving a complete cup open on sides & one end open filled the cups with flake Cobalt Thro. 20 also Thro 40 both require about 650 mlg then ends are closed & cup inserted in grid - ready to be welded in Hydrogen then to be filled with NiOH2 by successive dipping & drying - I find the jarring way of filling is O.K. & that leaves it ready to check & filling - The cup cutters should be made .005 larger & after filling pressed to gauge .005 thus putting a tension on the flakes

Mch 22 1905

against the cup it will require a little more crump to flake or a little more flake

April 10 1905 — SBat

We have trouble in getting the nickel plating to form perforated tubes on account of cracking when it gets thick = We first plate on the nickel 1/4 inch the tubes by filling with Chalkoe Sulphur &c with Zinc at low density then in slightly alkaline Amon Sulfate Nickel hot, but are troubled with the Ni cracking when it gets thick enough

We are trying Double Ni Ammon Chloride also Double Ammon Ni Oxalate, + various deductions

If so, we will have to omit the perforation + use type metal mandrel melt it out + clean with acid + perforate by rotating on a mandrel

smaller than the bore
& provided ~~with~~ as a female
with indents a similar
to what we know use
May have to use a wire with the ends
turn inwards & drawn down
Eating out from by acid &
then perforating -

April 12 after a vast amount
of experimenting I do have now
got one that gives hope of
doing something, on the
theory that the cracking
of the metal plus wires
due to tension produced by
hydrogen & put H_2O_2
in solution to combine with
the H. it works & I am enabled
to get it check without
cracking & with the knowledge
the Rod with holes filled
with tar & lung black
but coloring illegible

Apl. 12 1905

Eat out the Zinc the Hydrogen
Crack the Ni to plate
over it — can grow
to take it out by plating
it out — 21% KOH Solution
to get rid of the H
also to obtain best Ni
Solution + H_2O_2 = [illegible]
alkaline, [illegible]
commercial H_2O_2 =
Also plated copper tubes
made by chilling on —
Record for plating & refine
plate — Chilled tube
Cool 20 below Zero Think
or thermometer —
Thick lined rubber mandrel
Can be chilled out of
plated tube —
Copper tip Cadmium under
Zinc —
Tried making tubes of Rag
fuel block but around mandrel
wrapped + battled + then
plated together or coated
with, it requires to be

april 12 1905

started track to work
also started work on
way tube but it cracks
here also –

Apl 26 1905

Do not so clear Enough to cover
the green leaf in the well,
flake Co, with the ratio of
1 in. thro 20 on 180, it won't
covered with 8 in - 3 flake 1 molas
neither with 2 molasses —
The flakes go together like thru
they do the leaf and around
the pail each, Enough Cy
the track is a thinner
flake that will go
thru the Co – that used to
Gelwson .0002 + .0003
Ohio and to cover well it
must be Gelwson .0001 + .00015

April 20 1905 SB

I am trying other sticky stuff
Flypaper or stuff thinned by
Benzene to right consistency
after which I can be got a coil
of elevating it into the chamber
by the sticky stuff

Weight of tube 3.25 long - 1,460 -
Material Reg mix pkd hard
weight in 4.300,

1/2 inch waste both ends
net 2.75" length actual material

Reg balling tube net length
3.75 - which gives 5.861 grms
per tube Reg mix
against 9.21 in E 18 -
or 82% of that in E 18 in new
6 plates -

Apl 20 1905

with 4 grs N Thio 20 on 180 —
1.75 flake Co .0001 @ .00015 —
1 grm Molasses — not perfectly dry
dry that Molasses Evap 1/2

leaves 4 grs N 1.75 flak 520 mlg
Molasses leaves
92% of N & flake —
30.48% flake 69.57 Ni —
after Metal taken out.

or with allow 64% Ni 8% Metal
28% flake —

Weight ok 4330 grms
277 Nickel hydrox
1.212 flake —
346 mlg Molasses grms of S
The grid was Co plated
This gives as compared with Req mx 80% of Ni to 100% Req mx —
with longer tube & saving of tube & less Molasses prbly get 83% of what can get in tube with Req mx

Edison tube calc — No. 1

4 grams iron
1.750. Co fell ake, .0001 to .00015
1 molasses —
Tube plated .002 Co Ni, alloy
70% Co 30 Ni —
Thumped hard — not Corrugated
Soaked all night 1½% KOH,
Changed once —
Calliper 276 — Run 21%

Weight of material 4.350.

leaves 3.707 volume free of
Molasses —
or 69.57% in OH

or 26.57% in pt, giving 26.90 grams

Drying shows Molasses loss
only 28 to 30% hence 26.90 correct

Sept 21 1905

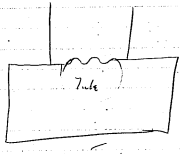
Cylinder 1 dia 2 long 1 dip
10001 – producers 10 grammes –
Double section 20 cylinders. 1 dip
200 grammes, 40 dips in 20 hours
8000 grammes or about 18 pounds
for 2 men –
9 sections wanted for 125 lbs
Daily – 14 men –
2450 – 2 men 19.00
4 Laborers 7.00 – Hydraulic press
2 men
Total
44.50

35.6 Cents lb for Labor –

30 ft each double section – in row 210
Double row 105 ft

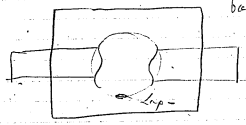
Probably bldg 40 wide 150 long

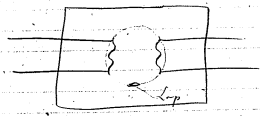
Apl 23 1905 SB



one side Corrugating

both sides





Apl 28 1905

If will the Iron can be used
instead of Zinc for
forming Co. or Co M filter
the year being taken out by
acid — its blower than
Zinc but probably pinner & cheaper

Designing Complete outfit
for 125 lbs of .0001 Coli
filter Daily — Travelling
Crane — Two sets of
20 Revolving Drums 1 x 2 —
Each 1 meter Cross hinged Fr —

Requires 4 sets of probably
6 Ft by 150 X 40 —

Am trying Vitrifiable from
Chlorides to Sphuryles
then Reduce by Burning
then Reduce Co + M
by the new the new
going into solution

apl 23 1905

think can make it go -

Σ no 1 tube 1st run 425 to V

2nd 563 3rd 568 -

This shows that a large amount of resistance material is still out of contact & that the tube must be subjected to great pressure with a corrugated die to pack the particles closer & increase size of contact between green & green

No 2 also between green & flake C No

should have given 852 to V or 284 lost by bad contacts,

12000
7 52500
2250

18000
7875
3375
29250

22 Runs.
Original Cath Cap 765
after 22nd run Hot 1st run on board 740

4000
1750
6500 | 7500 | 1.15
6500
1000
3500

6500 | 17500 | 2.69
13000
4500
39000
5230
637
3661
1369
31380
5.3.31

1750
4000
5250
6271 | 40000 | 63.7
39000
1000
23250
22250
46750 | 25.0
750
1750
1225.0

6500 | 40000 | 61
39000
1000

6500 | 17500
13000
4500
39000
6500

11.5 Mol
2619 Hole Co
61

333
25
1366
66
4

4000
750
1750 | 11.5
6500
6500
1000
6500
3500

Apl 25 1905 30% flake

Edison tube No 2

4 grams $Ni(OH)_2$ thro 20 on 180
1.750 - of Co flake through
30 mesh — 0001 but it Coarser & not covers perfect
750 mil g Molasses —
Not well covered.
Co Ni alloy plated tube - welded — H
but tube lap joint not welded —
packed in sections & lead hammer
put in one side Corrugated
Dia. 150 atmos Soaked
1½ KOH, get Molasses out
Ends rounded in freddys new
die, Run Reg in 21% —
Weight of active material —
333 mg 5.1230 — Corry 125 ohmos Cell per sec on Corry 4.13
~~4360 with~~ leaves 4796 - with
Molasses, or 3.357 $Ni(OH)_2$ —
Charged gas on 2nd Run 717 to Volt,

22nd floor room
Orig 750
after 22 662

29250 | 18000000 / 1755000000 / 42250000 / 1575000 | 61.5

1500000 / 36000000 / 4446000 / 7446000 / 7446000

29250 | 7425000 / 702500000 / 7255000 / 270000 | 268

29250 | 32250 / 3225000 / 45750000 / 2750000 / 7575000 | 11.5

8.66

Edison tube No 3
Same as No 2 except
No green Ilno 20 on 40 —
at the lowest accused a little better,
wt active material 5650
Cal on Conv side 260
Press 125 atmos
Rule Reg 21%

5650 | 61 / 565 / 33900 / 3444 | 5650 | 268 / 5085 / 33900 / 11300 / 3 | 1577 / 5066 / 2026.4

5000
2200
1000
8200 | 10000 | 12.18 - Mol
8200
1800
1640
16200

8200 | 37000 | 26.8 - flake
7620
7380
7380
6800

8200 | 50000 | 61
49200
8000

5000
2200
1000
8200 | 10000 | 13.4
8200
2000
1640
3600
3280
3400

8200 | 22000 | 26.4
16400
5600
3280
2320
1640
680

8200 | 50000 | 61
49200
8000

Edison Tube No 4

5 grain 20 on 40 -

2.200 Mg. flake Ni 0001 -
Very thin probably purely
0001 - Enormous
Covering power. much
less wetted surface
1 Molasses
Run Reg 21.0/0
Corrug 125 alines
Calliper on Corrugtns 253
Wright Oxative Material 5.155 -

3.24 grain
2
6.48

22 Hatrus
Orig 390 =
22nd 475 =

5000
2625
1000
8625) 10000 (11.5
8625
13750
8625
5125
57

8625) 26250 (3.0
25875
375
8625) 50000 (5.9
43125
6875
6900
837

Iron flake –
Edum Tube NOS

5 green 20 on 40
2.6 25 flake 70% 072
30% Cobalt
1 Molasses Covers only
fair – made by
Warren plate
Corring 125 almos
Calliper on Corg Tus 255 –
Wright Relieve Head and 5.355 –

11.5 mol 20 on 40 Cov
30 flake –
57.9 green
94

22 in Hot leaf
orig 4.65
22 in hm 2.98

5000
2 200
1 000
8 200) 15 2000 (1.21
8 200
7 000
6 200
1 600
1 600
0

9 200) 27 2000 (2.69
18 400
8 800
7 200
1 600
1 600
0

8 200) 50 3000 (6.1
49 200
0 800

3.08) 6.30 (2.04
6 16
1 40
1 232
3) 2.44 (.78
2 24
20

Edison Tube No 6

5 green 20 on 40

2.200 flake 60 Co 40 Ni
mgat rolled & cut
in slivers - dont cover
well — 0002
dont hand around & when
dry slivers come off
1. grm malleable

Run Reg 21.0

Corrug 125 alum

Caliper on Corrug 250

Weight Actual Material 4.895

3.08 Net.

12.1.1 Mat 20 on 40 Cut Rolled Sliver -
2.619 flake Co 60/40
61.0 green
19.0

Edcom Tube No 7
Reg grazed 20 on 40
no flake -
Run Reg
Corrug 120
Calliper on Corrug 260
Weight actual Mechanical, 4.650

22nd Hot lead
orig 730
22nd in 942.5

5000
2200
800) 5000 (62.5
4800
200
4
800) 22000 (27.5
16000
6000
5600
400
800) 9000 (10

5000
2200
7200
5041

5000
2200
800) 9000

Edison tube No 8

5 grain 20 on 40
21.200 flake Cobalt 60%
Ni 40%. Electroplated
by Warren 0002 —
poor covering power
800 mlg Ulbrand.

Coring 125 calm
Calliper .256
Weight calm Wallmark
5.440 -

3.49 - green

Cobalt 62.5
Ni 27.5
Mg -10

22nd Heat Cast
Orig 660
22nd rm 610

6000
2625
1125
9750 | 60000 (61.5
375000
19750
5250
5250

26250 (269
19500
6750
5000
9750
1750

9750 | 11250 (115
9750
1500
9750
5250

6000
2625
1125
9750 | 11250 (115
9750
1500
9750
5250
5250

Edison No 9 Tube –
6 grow thro 20 on 40
21 625 flake from Hydrals
Co & Mi 70 x 30 Mi
Rolled –
1.125 Mal –
Flake too thick dont cover
hardly any – Had
accident with tube –
broke head separately
poby ng –
Weight active Mal 5325 –
Cal 266
atmos Cor 125 –

339 24 HOH grow

Chrom 61.5 –
flake 269
Mi – .115

May 4th 1905

flake Co Sulphide

3 Co_2O_3 — 3 Sulphur — Excess of Mono Sulf K — large cryst to crusts ok — considerable black

3 Co_2O_3 4 Sulphur Excess KS — ng no crystals

3 Co_2O_3 2 Sulphur KS — Excess think it as good if not better than 3 Sulphur — better yield + best

KS alone ng — no Crystals —

KS + KOH, no S — 3 grm Co_2O_3 ng —

Have just (unmolded) a big Crucible 60 grms Co_2O_3 40 grms Sulfur 2 lbs K Sulfide think it going to be good — it shrinks 60 to 65% the bulk after Cooling

May 4 1905

If from the larger Crystal are too thick may have to cool quicker or screen out small coat the largest & return to pot

They roast ok. + easily will make beautiful flake when reduced

The trick is to keep heat up till the KS shrinks then increase heat till it is liquid or nearly so = The KS melts at low temp. boils violently ~~but the~~ but it is very liquid (mobile) as the heat of crystallization of contracts of chickens at same time — when fully contracted raise heat to get it liquid or nearly liquid again — then cool slowly for large crystals = Possibly the heat must continue for some time to get best yield

Am trying this

May 4 1905

Am now running a 70 Co + 30 Ni from the oxides to see if they go together or crystallize.

1.500 Oxide Copper
1.500 Cobalt OX
2.000 Sulfur

Large yield - plates, macled
Cry - darkish but whole but this may be due to much in the batch - OR anyway thinness Reg

1.500 Oxide Bismuth
1.500 " Cobalt
2.000 Sulfur

Brilliant smooth Crystal Colour
very little muck good
yield - Crystals fair some thick
balance Reg thickness -
good + - Silver like Color
Good Color smooth Reg Crystals

May 4 1905

2 grms Oxide Cobalt
1 " Iron Ox
2 Sulfur -

Yield fair - plates not
[illegible] but varying
largest crystals [illegible] or fair
acetic also some fr [illegible]
from muck & think, dark
shining crystals.

2 grms Ox Cobalt
1 " Cadmium
2 Sulfur

Yield not so good - plates,
Reg - [illegible] CdOx
in [illegible] muck -

May 4 1909

No 20 -

2 grm Nickel ox
1 " Chromium ox
2 " Sulfur -
Bo " KS

3.35 | 760 | 222.85
1670
920
835
850
700

8.53 | 3.71 | 23.
1492
1113

380 | 158 | 2.93.3
380 | 1007 | 1670
1140
530
530

2.7 | 140 | 3
140
0

7 | 348

25 | 314 | 3.35
3.14
134

25 | 335 | 134
25
85
75
100

May 4 1905.

21 -
2 grms NiOx
1 " MnO2 Cobalt Ox
2 " Sulphur
30 " KS

May 4 1905

22

2 grm Mn ox
1 " Permanganic ox
2 " Sulph
30 " KS

May 4 1905

23

2 grms Ni ox
1 " Tin ox
2 " Sulfur
30 " KS

May 4 1905

24

2 grm Ni ox
1 " Cobalt ox
2 " S
30 " KS

Broke —
Duplicated it —

May 4 1905

25

2 grms Ni ox
1 " Lead ox
2 " S
30 " KS

May 4 1905

26

2 grm Cobalt ox
1 " Manganese ox
2 " S
30 " KS

27. May 4 1905

2 grm Cobalt ox.
1 " Cerium ox
2 " S
30 KS -

May 4 1905

28 –

2 grms Cobalt ox
1 " Chromium ox
2 S
30 KS

May 4 1905

29

2 gm Co ox.
1 " aluminum ox
2 " S
30 KS

Made May 4 1905

30

2 grm Ni OX
1 " Bismuth OX
2 " Si
30 KS

May 4 1905

31

2 grm Co ox
1 " Zinc ox
2 " S
30 KS

May 4 1905

32 —

2 grm Ni ox
1 " Cd
2 S
30 KS

33

May 4 1905

2 grams Ni ox
1 " Iron ox
2 5
30 KS

May 4 1905

34

2 grm Ni ox
1 Cerium ox
2 S
30 KS

May 4 1905

35

2 grams Ni OX
1 Manganese OX
2 S
30 KS

3.66
.22
7.32
7.32
80.52

6000
2560
1000
9560 | 18000 | 1.04
9560
9400
600

9560 | 6000 | 6.27
5732
26800
19120
7680
7640
40

366
1.09

9560 | 2560 | 2.67
19120
6440
5732
708
7

3.66
.22
7.32
7.32
80.52

366

5.750
6.26
5.750
1.500
1.500
3.4516
3.66

Edison Tube No 10—

6 green/green thro 20 on 180 — but not mixed with fine at bottom of bottle, hence longer than No 11 Tube, it covered almost perfect .0001. Warren plated flake 70 Co 30 of 30% Nickel & pr. n G. McCly Cathodes to connect Run in 21% Hot after ~~3 Runs Reg Cond~~ — its No 9444 — Packed ~~[illegible]~~ Lead ~~[illegible]~~ by hand 7 W Zeight good Ends — Tubes plated Co Ni alloy by Warren —

The mix original

Grs 6219 6 000 green 20 on 180
Nos 1314 2 560 Co Ni 70/+30 flake
flake 5.7 warren plated by Warren
1 000 Nickel
active material in tube
dry 5.750 —
3.66 green

Edison tube No 11.

Same as 10 except the grain had more fines in. Didn't cover so well to Gr. Rim — 21% cold all the time.

actual material in tube dry 5 690.

Edison Lab. No 12
62 Temps. 0001. Okanogan - Dally
Covers perfect very sticky —
Cleaned with hydrogen —
6 000 green
2.600 flake Cobnet only
1.500 Malaccas —
Active material in pkt 5635 —
62.17% green. flexibility
3:500 grms green - Calkpm 261 -
to 62 rum Rey cm 21%
~~261~~ green
3:35

59.4
14.8
25.7

30.2

1448

Edison Lake No 13,

Same as No 12 except flake Co ~~was~~ had ammonia passed after reduction or rather cleaning by Hydrogen - the formed nitride appeared bright & OK - Covers perfect very bulky - its somewhat brittle,
61 Jumps
Wt active material 5.5%
Capacity 263-
to German Req in 21%

3.57-

Edison Tube No 14

5.600 grms green with 9% Bi_2O_3
precipitated together — Ratio 20 on 180
~~[illegible]~~ rather fine —
2.400. of .0001 ok Daly Co Sn Cf
plated film — cleaned in H,
1.500 Malaccca — Coarse round
but not so well as Reg in it
is finer + [illegible] Mem [illegible] so G
not so stickey apparently

Weight dry coatings in Cond 5.550
Cold pen 2.58 [illegible]
Run — 21% Reg —
Jamps — 58
Tubes plated in Cd Ni alloy [illegible]

Tube broke + lead put [illegible]
in new tube — probably [illegible]
notice nearly all green [illegible]

3.55 green

Edison Lube 15

6000 grain thru 20 on 180

2.600 Flake Nickel on rock which has been nitrided by drawing [illegible] over it - it makes it drain which baffle but covers good but not so well as nickel plain

1.500 Wind Cover -

Jumper 52

Weight active machine Dry 5.530

Calliper - 2.64.

3.54

Edison tube No 16 =
6000 [illegible] thro 20 on 80
2,600. Women 70 Co 30 Ni 000 ok flaker
Screened thro 80 mesh. Covers very well.
Considerable but cost in Trying get thro
screen after Hydrogen is some stick together
etc. Brick w only 1/2 of cobalt Cover.
film is but Covering proves not measured
any difference —
Core 125 ohms
Calliper 260
Temps 48
Weight Req material .5430
Weight Grain —
to be run Req m 21%

A Reg tube packed with 3 lb
wet falling 5" with Reg
mix weighed 6.4485 — empty 1.380
mix 5.068
Soaked in water 3 hours
then took out shook it
+ pressed thro fingers
weighed 7.450.
gained 1.002 gm
or 14% in weight —
poly 25% approx —

June 3rd 1905 S.B.

Try Sugar
Caramel.
Gelatin
Caramelin + Carmalein
Dextrin.
for Coating flake Ni on
Green Ni $(OH)_2$ —

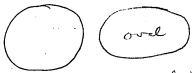
Try ~~[illegible]~~ sizing green
on 20 30 50 80 100 120

150 180 200 - size flake +
Cover separately size flake
is only in big or grains —
then try to gether on
properties that could use on
tall cup —

also take mish + squeeze so when
dry has 20 mesh then wash
& dry -

June 3 1905

pack tube oval



so it can have a chance to swell round this is very important to raise capacity
the degree of oval to be determined by the capacity for same weight given out test of cells —
The swelling showed increase the bulk abt 20% & then stop - this is given by the oval —

Experts show that 5" drop & abt 3 lbs weight is best for packing material in tubes & in 4 inch tube about 50 dabs of active in packing belt
Each dab —

June 3 1905

Hot Endurance,

5 Tube Cells Req 3 lb 5" pack
70% Co 30 Ni - Round tubes, 2 4½ ⌀
Fe - Metal Cells 21%. 150 dia
rots,

5 ditto oval tube

$$\begin{array}{r} 256 \\ 25 \\ \hline 250 \\ 128 \\ \hline 122 \\ 51 \\ \hline 71 \\ 64 \\ \hline 7 \end{array}$$

$$\begin{array}{r} 256 \\ 2 \\ \hline 4 \\ 1 \\ \hline 3 \end{array}$$

June 20 1905 SB

Think it possible that can use muddy nickel in place of manganese to attack flake NiCo to green $Ni(OH)_2$ thus would make fine Contact,

Possibly very Conc Metaphosphoric or the salt mixed with nickel oxide would be sticky enough to attack flake to green hydrate and then put in KOH heat up to the $Ni(OH)_2$ and generate and the Metaphosphate thus also would make significant Contact,

Expect to find a very sticky Ni Salt Solution Conc so can be used in place manganese to attack flake NiCo to green $Ni(OH)_2$

~~The~~ Possibly if a nickel salt Conc was mixed with the manganese it would serve the purpose of making Contact by displacing out the Manganese in 1½% KOH. Then pp the Ni in Stan —

4) 157 500.
30
127

945 500 –

300 000
300 000

130 000
112 000
30 000

273
45
318
2 700

750
52 500
30
52 530
58 5

1.102 500
137 000
945 500
25 000
970 500

700 –

85
36
49

750
49
67 500
3000

90 000
160 000
250 000

36

2700 000
1350 000
30 000
160 000
320 000
4450 000
600 000
5000 000

367 320
1.102 500
6.

31%

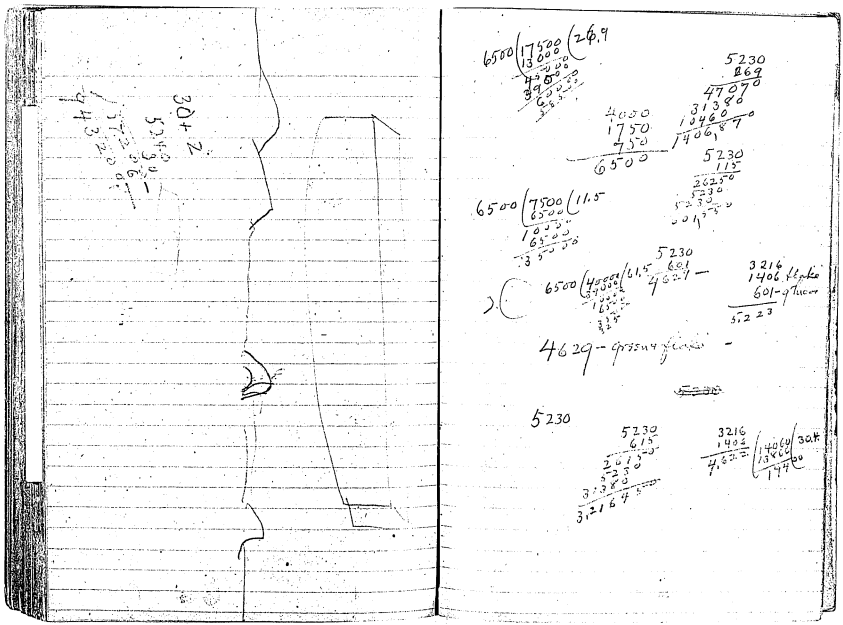
769
32
150
651
25
676

695 –

400 –

320 000
2.100 000
5 000
2.425 000
2 500
2.422 500

3907.50
3120



Tube	1	2	3	4	5	6	
25X	570	681	710	735	736	720	722
26X	566	668	696	720	723	705	712
27	517	641	671	686	700	677	682
28	567	670	692	716	727	707	715
29	685	800	817	837	843	827	825
30	812	911	927	945	947	927	937
31	684	840	856	887	892	872	888
32	750	873	907	930	920	917	930
33	587	786	821	842	830	822	840
34	510	682	701	687	706		
35	592	727	745	741	743		
36	535	717	744	732	737		
37	732	783	801	807	782	797	
38	721	687	641	775	688		
39	437	525	550				
40	533	728	760				
41	517	735	777				
42	493	747	774				
43							
44							
45	480	625	685				
46							
47	610	762	785				

Note. 38 ?

*Remarks: 25 to 28 were dried before pulling in from 29 [illegible] not dried – water [illegible] or quenches [illegible] when not dried.

48		
49		
50	425	486
51	"	
52	500	570
53	515	580
54	622	676

4823 – glucose spot

55	650	722

5810
17
40670
5810
5810
987
4823
4162
5810
28
3661
1621

3061 glucose
1162

25 | 712 (28
50
212
712
38
790

4823 | 11620 (24
9646
1974
1929
45

61 | 61
27
8
1

61 00 : 1 00
2700
1200
100
2700
2700
0

18000 6150

		Hot 50
9723	727	228
22	680	200
21	650	230
20	645	230

	Inter. Inter.	Inter.	Hot 50	100	150	200	250	300	350	400	450	500	550	600	650
9352	710	15	440	555	620	620	595	525	565	620	415				
51	659	15	492	550	658	570	520	397	412	440	422				

50 Rum Hot

	Cal 24°	Hot 50							100 Hot T 132	133		50 Hot	
10	845	788	792	777	800	782		837	883	836	837	30	
11	840	380	910	402	427		506 SC				376	382	
12	847	775	795	778	825	806		865	876	871	790	865	
13	887	705	777	767	800	806		737	762	763	755	652	
14	820	700	750	760	785	781		650	736	771	720	695	
15	785	418	455	457	470	450		SC	393	385	310	345	
16	817	650	647	689	685	690		640	682	650	532	590	
17	27												
18	28												
19	655	667	657	650	640	622	100 Hot 119 632	628	480	382	350	487	437
20	690	645	675	657	665	658	657	682	695	395	607	600	392
21	736	665	670	682	681	600	611	650	665	395	640	582	739
22	737	646	650	625	565	350.7	592	617	620	490	577	350	395
23	700	285	280	50	50	257	220	220					
24	692	263	275	249	291	285	550	577					
25	789	235	235	217	250	237	185	200					
26	775	233	225	212	200	50	50	162					

Co

Oval

	Cal Lactose	Hot 48					
10	796	732	220	190	172	200	
11	795	765	222	235	221	231	212
12	794	750	205	195	170	205	190
13	793	770	175	177	188	225	200
14	792	732	257	297	278	337	310
15	791	752	225	205	200	240	224

Co

Lactose Solid Raw Begins —

								100 Hot			150 Hot		
	981	495	415	400	392	400	377	295	490	285	248	257	195
	80	495	422	400	393	422	394	276	320	280	290	297	275
	79	500	426	401	392	427	400	321	305	290	272	232	270
	78	493	441	425	410	430	420	321	297	50	25	217	50
	77	465	361	315	300	297	250	231	256	240	228	177	177

50	883						
50	815						
385	882						
670	677						
717	740						
382	395						
60	620						

10 — Corn flakes cow quad. 3.66 green
11 Stop that work from dead cow as well
12 Cellulose 3.61 green — Corn pasted
13 Cellulose 3.0 — 3.7 g
14 Rum
15 Flake is initial. 3.54 g corn quad
16 Corn flakes recommend [illegible]

	250			
10	645	702	730	753
11				
12	787	825	838	850
13	467	502	525	553
14	550	618	651	675
15	237	246	250	262
16	420	452	476	486
	250 Rum			
19	300	355	350	
20	500	457	396	
21	475	425	306	
22	380	368	332	
23				

Co

	250			
	648	771	778	845
	237	265	270	275
	775	840	875	875
	SC	530	596	560
	567	650	685	700
	225	261	257	252
	SC	SC	SC	597

690
50
740
247
987
492
495
483
.04
1890

324
2
4
64

324
2
8
64
64

324
2
4
8
64
64
.04

216
216
216
216
.0
216
216
216
.04
5
5

Ray Tubes Requires cor inside 33%

	Cold		48	Hot 28	52	87		90		
94	75		885	637	682	431	392	430	485	5[illegible]
74			850	655	760	545	502	530	590	6[illegible]
73			775	650	495	50	280	232	230	2[illegible]
72			872	887	825	665	592	675	731	7[illegible]
				Hot		Hot				

had 22 more hot tests.

94 75	500	492
74	635	627
73	245	185
72	750	757

Not Corrugated — one side — 33% — other — 21%

Oval tube —

10296	670	712	780	732	
95	680	725	805	765	
94	672	697	805	750	
93	675	725	800	770	
92	677	705	782	732	
91	725	747	817	782	

on half tail,

Not hot

Regg tube, Regular Corrugated all

10316	707	775	780	777	792	790	800	842	
315	730	775	780	780	795	785	790	800	
314	712	825	825	807	807	806	812	816	
313	727	830	840	827	822	825	828	830	

Not

Hum burn tube heat — one side not done — Hum burn tube heat — Hum burn tube heat

Zello Corr on one side 6 +

10320	472	705	785	793	812	825	840	842
19	592	710	775	796	813	827	840	842
18	512	742	815	822	845	852	858	858
17	577	780	846	860	867	880	887	884

Not

Same not Corrugated at all

10324	692	765	816	830	843	835	687	662		
23	692	775	821	815	[illegible]	[illegible]	865	861		
22	692	847	[illegible]	[illegible]	857	870	[illegible]			
21	657	832	[illegible]	[illegible]	847	[illegible]	[illegible]	[illegible]	882	882	886	886

Not hot

Time getting flow on a [illegible] not heat

10379	820	730	717	[illegible]	[illegible]	825	
78	527	753	805	[illegible]	[illegible]	835	
77	570	793	837	[illegible]	[illegible]	870	
76	575	770	827	[illegible]	[illegible]	880	

Not tee

Run Hot

Anything connected —

4 Mitral Cells to Germ hot.

Reg mix – tubes –

	Col 2								
9/23						725	745	735 ✓
22						717	720	721 ✓
21						775	682	675
20						715	707	700 ✓

9/23	762	747	727
22	722	723	680
21	700	697	650
20	700	732	695

calculated ✓

Hot Test - Conny

Tubes - Rag mix -

44 Refought on Endurance

		original	45	46	47	48	49	50	51	52	%
9408	33%	801	437	425	412	470	467	473	435	475	41%
06	21%	763	350	299	317	SC	290	390	337	375	51%
05	"	815	435	460	467	510	505	516	477	500	4%
04	"	811	537	575	600	625	300	650	622	653	19%
03	"	785	275	277	300	337	320	340	305	300	61%

Flat pockets -

Ni

		orig	45								
9414	44%		375	417	410	450	425	422	432	427	417
13	"		400	420	465	455	415	415	433	425	417
12	"		375	387	375	375	367	383	397	390	377
11	"		427	430	433	430	426	435	436	438	42[illegible]

72 Cr'd 18%

		45		
9414		0	1200	1200
13		SC	1250	SC
12		1305		1250
11		1200		

	67	68	69	
9414	SC	1200		
13	SC	1250	1575	1617
12	1200	1337	1950	1900
11	1305	1555	1900	1533

Apt-Ni

6pt Ni + Cot

	67	68	69	70	71
9414	SC	1200			
13	SC	1250	1575	1617	1755
12	1200	1337	1950	1700	1800
11	1305	1555	1900	1533	1600

460	416	
467	416	
420	412	
473	443	

Spot CO

		83%		86	
9408	410	347			
06	132	150		160	135
05	410	400		380	432
04	565	550		585	590
03	142	145		172	165

Hot Test -

Test Base - Re mix -
44 Runs hot exchanger

	45 cal
9486	437
.03	350
.04	400
.03	437

Tubro Reg ~~[illegible]~~ 50 Rimo hats

51st 42 51 32

9.08	9.75
06	875
05	
04	
03	

~~9447~~ Reg. 312 Minix-Reg. potato, to 90 mv. hot last

Cal. 155									224 Hot 200
9551	475	476	450	495	458	497	515	498	241
80	470	475	477	485	462	487	500	495	270
79	485	490	490	497	492	500	512	500	247
78	490	491	495	496	490	500	512	495	273
77	490	483	463	470	465	472	477	463	185

after, 50 hot runs 99 Total runs

Edison No 9	99 662	560
8	792	615
7	325	
6	720	
5	337	
4	633	
3	277	
2	482	

Average voltage on 99 discals

2	117
3	115
4	124
5	114
6	117
7	123
8	114
9	116

Tubes 1 to 26 Reading
not continuous

	Cal	Hot 26	22	23		50 feet 48	106	107	105	109
2	777		790	773	762	747	762	606	650	690	659
3	735	770	732	662	710	682	277	300	327	350	300
4	652	657	657	50	767	655	632	690	693	695	692
5	363	385	390	475	372	50	337	318	320	342	341
6	662	679	656	390	690	622	720	650	655	675	650
7	352	352	352	50	317	355	315	325	322	332	339	340
8	737	735	717	742	815	757	735	792	743	765	770	745
9	660	667	—	610	712	50	685	667	605	630	633	612

10	830	840	787	820	815	820	835	840	837	842	845
11	846	842	815	827	825	830	832	837	835	830	840
12	892	900	875	870	857	857	885	875	877	867	867
13	900	910	850	843	892	842	841	841	880	843	867
14	870	850	775	812	800	797	810	838	792	792	830
15	737	740	740	714	740	715	770	792	792	742	785
16	775	770	767	797	792	797	775	790	800	800	817
17	27	22	20	25	30	20	35	20	22	25	27
18	0	10	20	25	25	20	23	23	22	25	28
19	600	600	555	595	632	600	632	650	635	637	655
20	691	690	650	50	690	670	690	680	650	677	690
21	740	735	687	735	735	730	722	737	725	735	736
22	710	715	700	696	700	700	700	712	717	700	737
23	691	685	640	695	690	720	690	700	700	697	700
24	50	680	650	650	675	650	675	687	650	650	682
25	795	795	792	777	775	793	790	790	792	785	789
26	707	700	680	735	755	765	725	760	770	787	775

110	127	128		50 feet 249	320		Hot	319	320				
657	682	740	701	732	740	745		725	586		600	735	
312	587	650	615	670	710	725		725	646	722	700	735	
657	689	695	700	675	725	730		740	730	730	740	775	
326	340	360	375	75	45	40		45	27	20	20	25	
630	680	650	657	620	630	632		645	622	622	618	665	
321	50	305	323	257	275	308		290	180	228	220	260	
725	615	655	710	540	637	647		685	555	592	531	670	
583	560	620	640	560	504	512		530	367	365	306	347	

10	850	838	
11	840	795	
12	875	850	
13	900	870	
14	823	815	
15	787	732	
16	817	795	
17	36	25	25
18	36	35	25
19	687	637	685
20	700	690	717
21	750	737	755
22	50	717	770
23	720	692	750
24	717	692	737
25	790	750	833
26	780	772	817

Hot Coil

Heat.

Actual length of heat tubes (full)

2.1 1/16 —

4 inches

fuselage —

21% 730
33% 822
2 777
3 737 - 770 - 732
4 650 657 651
5 363 385 390
6 662 675 656
7 352 352 352
8 727 735 717
9 660 667 347.5

} gone on Hot test

22 [illegible]	23rd	99 [illegible]	
740	773	482	550
662	710	277	300
SC	767	633 +	
475	392	337	312
298	690	720	665
SC	317	325	313
942	815	792	562
610	712	662	590

10 - 200 - 535 - 677 770 - 781 - 785 - 797 - 815 792 807 | 780 795 820 830
11 150 - 385 - 572 687 752 757 - 763 800 806 822 } 810 807 830
12 352 592 730 790 820 846 857 852 860, 850 872 887 892 (841
13 392 680 797 828 - 850 868 875 877 891 890 876 920 900
14 295 450 587 682 750 755 812 824 837 830 850 850
15 265 512 635 675 715 725 722 740 215 735 753 737
16 150 475 600 662 765 - 775
17 5 - 20 25 27 - 27
18 1 0 5 15 - 0
19 600 557 590 600 - 601
20 6?? 700 642 665 - 691
21 665 727 712 725 - 740
22 657 700 675 727 - 710
23 660 - 691
24 660 - SC
25 575 - 795
26 617 - 707

100 Rate — 150 Rate

Reg 21 - 593 - 772 - 823 | 853 - 800 - 835 807
Reg 33 - 633 807 852 | 830 852 - 882 - 875
Tube 2 - 328 - 490 - 600 - 673 | 700 | 727 | 762 | 763 | 700
3 - 277 SC 567 - 633 | 671 | 7?? | 743 | 756 | 750
4 - 379 - 600 - 642 | 631 | 637 | 652 | 650 | 645
5 43 50 77 | 65 | 131 | 177 | 200 | 222
6 202 - 460 - 588 | 642 | 663 | 686 | 6?? | 673
7 233 333 395 | 332 | 350 | 397 | 372 | 375
8 303 585 697 | 727 | 735 - 755 | | 752 | 735
9 193 430 552 | 607 | 650 | 680 | 687 | 680
No 1 593 | 567 - 5??

2 flake Co - thru 30 on 150
3 " thru 30 on 40
4 flake Ni or or ok - 20 on 40
5 flake 70 70 30 Co - " — [illegible]
6 60 Co 40 Ni rolled sliver "
7 only green "
8 60 Co 40 Ni warren "

288
300
86400
21
107
288
1752

4820

1100

4820
7055
38560
24100
33740
3401956

371
26
2226
7426
7426
964

3 | 288
70

300
2100

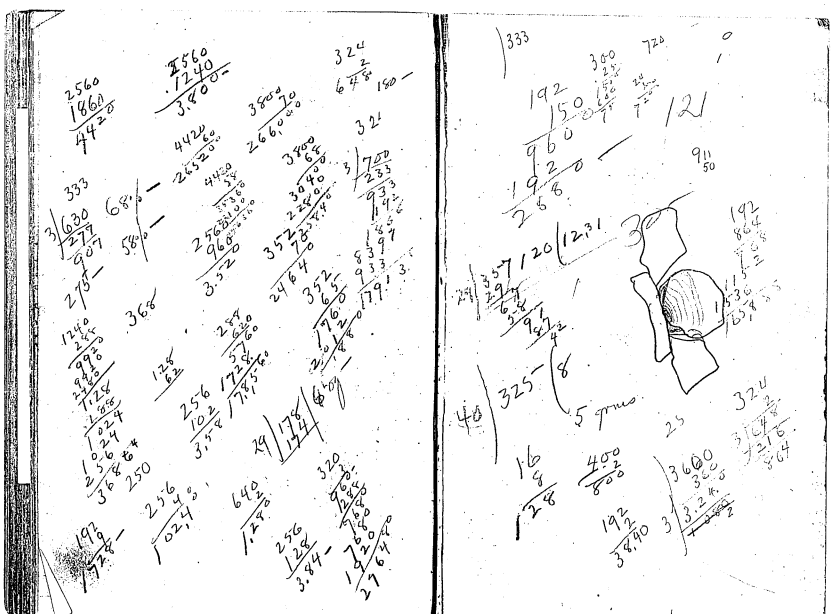
70

371
25
2597
7428
7017

8500 | 600000
37000
3000
2220
2220

8500

4920

371
1113

70.58